CLAIMS:

1. A method of protecting activated metalloaluminophosphate molecular sieve from loss of catalytic activity, comprising contacting the activated metalloaluminophosphate molecular sieve with a gas containing water at a temperature and water partial pressure effective to maintain a predetermined catalytic activity index, wherein the catalytic activity index is represented by the formula:

$$CAI = \exp(f(T) * f(PP_{water})^n * alpha * t)$$

wherein

t = time of contact of catalyst with water (hours)

T = temperature at contact (°C)

PP_{water} = Partial Pressure of water in contact gas (psia)

alpha = -0.071

n = 3.5

$f(T) = \exp(ea(1/(T + 273) - 1/(T_o + 273)))$

ea = -5500°K

T_o = 200°C

$f(PP_{water}) = (26.2 * PP_{water}/P_{sat} + 1.14) * 0.175$, for $T \geq 180$°C (453°K)

$f(PP_{water}) = ((26.2 + 0.272 * (180 - T)) * PP_{water}/P_{sat} + 1.14) * 0.175$,

for 180°C (453°K) > $T \geq 150$°C (433°K)

P_{sat} = Saturation pressure of water at T (psia).

2. The method of claim 1, wherein the activated metalloaluminophosphate molecular sieve is contacted with the gas at a temperature and water partial pressure effective to maintain a catalytic activity index of at least 0.7.

3. The method of claim 2, wherein the activated metalloaluminophosphate molecular sieve is contacted with the gas at a temperature and water partial pressure effective to maintain a catalytic activity index of at least 0.8.

4. The method of claim 3, wherein the activated metalloaluminophosphate molecular sieve is contacted with the gas at a temperature and water partial pressure effective to maintain a catalytic activity index of at least 0.9.

5. The method of claim 1, wherein the gas has a relative water pressure of at least 0.0001 and contacts the activated molecular sieve at a temperature less than water critical temperature.

6. The method of claim 5, wherein the gas has a relative water pressure of at least 0.001.

7. The method of claim 6, wherein the gas has a relative water pressure of at least 0.01.

8. The method of claim 7, wherein the gas has a relative water pressure of at least 0.1.

9. The method of claim 1, wherein the gas contacts the activated molecular sieve at a temperature of from 150°C to 300°C.

10. The method of claim 1, wherein the activated metalloaluminophosphate molecular sieve is contacted with the gas for not greater than 500 hours.

11. The method of claim 10, wherein the activated metalloaluminophosphate molecular sieve is contacted with the gas from 0.01 hour to 50 hours.

12. The method of claim 1, wherein the activated metalloaluminophosphate molecular sieve is a silicoaluminophosphate molecular sieve.

13. The method of claim 1, further comprising stopping contact of the activated metalloaluminophosphate molecular sieve with the gas and storing in an anhydrous environment.

14. The method of claim 1, further comprising stopping contact of the activated metalloaluminophosphate molecular sieve with the gas and contacting with an oxygenate to form an olefin product.

15. The method of claim 1, wherein the catalytic activity is catalytic activity in reaction processes selected from the group consisting of catalytic cracking, hydrocracking, dewaxing, olefin forming reactions, aromatics forming reactions, paraffin isomerization, olefin isomerization, paraffin hydroisomerization, olefin hydroisomerization, olefin oligomerization, olefin polymerization, reforming, alkylation, and disproportionation of aromatics.

16. The method of claim 1, wherein the activated molecular sieve is contacted so as to maintain an ethylene or propylene selectivity of at least 25 wt %.

17. A method of protecting catalytic activity of an activated metalloaluminophosphate molecular sieve in olefin forming reactions due to contact with water vapor, comprising contacting the activated metalloaluminophosphate molecular sieve with a gas for a time effective to maintain the activated metalloaluminophosphate molecular sieve at a catalytic activity index of at least 0.7 and at an ethylene or propylene selectivity of at least 25 wt %, wherein the gas is at a relative water pressure of from 0.0001 to 1.

18. The method of claim 17, wherein the gas contacts the activated molecular sieve at a temperature less than water critical temperature.

19. The method of claim 18, wherein the activated metalloaluminophosphate molecular sieve is contacted with the gas for a time effective to maintain a catalytic activity index of at least 0.8.

20. The method of claim 19, wherein the activated metalloaluminophosphate molecular sieve is contacted with the gas for a time effective to maintain a catalytic activity index of at least 0.9.

21. The method of claim 17, wherein the gas has a relative water pressure of at least 0.001.

22. The method of claim 21, wherein the gas has a relative water pressure of at least 0.01.

23. The method of claim 22, wherein the gas has a relative water pressure of at least 0.1.

24. The method of claim 17, wherein the gas contacts the activated molecular sieve at a temperature of from 150°C to 300°C.

25. The method of claim 24, wherein the activated metalloaluminophosphate molecular sieve is contacted with the gas for not greater than 500 hours.

26. The method of claim 25, wherein the activated metalloaluminophosphate molecular sieve is contacted with the gas from 0.01 hour to 50 hours.

27. The method of claim 17, wherein the activated metalloaluminophosphate molecular sieve is a silicoaluminophosphate molecular sieve.

28. The method of claim 17, further comprising stopping contact of the activated metalloaluminophosphate molecular sieve with the gas and storing in an anhydrous environment.

29. The method of claim 17, further comprising stopping contact of the activated metalloaluminophosphate molecular sieve with the gas and contacting with an oxygenate to form an olefin product.

30. A process for forming olefin product from oxygenate feed, the process comprising the steps of:

a) contacting an activated metalloaluminophosphate molecular sieve with a gas containing water at conditions effective to maintain the activated sieve at a catalytic activity index of at least 0.7 and an ethylene or propylene selectivity of at least 25 wt %; and

b) contacting the water-contacted sieve with an oxygenate feed to form an olefin product, wherein the olefin product contains greater than 50 weight percent olefin, based on total weight of hydrocarbon produced.

31. The process of claim 30, wherein the activated metalloaluminophosphate molecular sieve is contacted with the gas for a time effective to maintain a catalytic activity index of at least 0.8.

32. The process of claim 31, wherein the activated metalloaluminophosphate molecular sieve is contacted with the gas for a time effective to maintain a catalytic activity index of at least 0.9.

33. The process of claim 30, wherein the gas has a relative water pressure of at least 0.0001.

34. The process of claim 33, wherein the gas has a relative water pressure of at least 0.001.

35. The process of claim 34, wherein the gas has a relative water pressure of at least 0.01.

36. The process of claim 35, wherein the gas has a relative water pressure of at least 0.1.

37. The process of claim 30, wherein the gas contacts the activated molecular sieve at at a temperature of from 150°C to 300°C.

38. The process of claim 30, wherein the activated metalloaluminophosphate molecular sieve is contacted with the gas for not greater than 500 hours.

39. The process of claim 38, wherein the activated metalloaluminophosphate molecular sieve is contacted with the gas from 0.01 hour to 50 hours.

40. The process of claim 30, wherein the activated metalloaluminophosphate molecular sieve is a silicoaluminophosphate molecular sieve.

41. The process of claim 30, further comprising polymerizing olefin in the olefin product, in the presence of a polymerization catalyst system in a polymerization reactor, to produce one or more polymer products.

42. A process for converting oxygenate to an olefin product, the process comprising the steps of:

a) loading an activated metalloaluminophosphate molecular sieve into a reaction system;

b) contacting the activated metalloaluminophosphate molecular sieve loaded into the reaction system with a gas containing water at conditions effective to maintain the activated sieve at an ethylene or propylene selectivity effective to convert an oxygenate feed to an olefin product, wherein the olefin product contains greater than 50 weight percent olefin, based on total weight of hydrocarbon produced; and

c) contacting the water-contacted sieve with an oxygenate feed to form the olefin product.

43. The process of claim 42, wherein the activated metalloaluminophosphate molecular sieve is contacted with the gas for a time effective to maintain a catalytic activity index of at least 0.7.

44. The process of claim 43, wherein the activated metalloaluminophosphate molecular sieve is contacted with the gas for a time effective to maintain a catalytic activity index of at least 0.8.

45. The process of claim 44, wherein the activated metalloaluminophosphate molecular sieve is contacted with the gas for a time effective to maintain a catalytic activity index of at least 0.9.

46. The process of claim 45, wherein the gas has a relative water pressure of at least 0.0001.

47. The process of claim 46, wherein the gas has a relative water pressure of at least 0.001.

48. The process of claim 47, wherein the gas has a relative water pressure of at least 0.01.

49. The process of claim 48, wherein the gas has a relative water pressure of at least 0.1.

50. The process of claim 42, wherein the gas contacts the activated molecular sieve at a temperature of from 150°C to 300°C.

51. The process of claim 42, wherein the activated metalloaluminophosphate molecular sieve is contacted with the gas for not greater than 500 hours.

52. The process of claim 51, wherein the activated metalloaluminophosphate molecular sieve is contacted with the gas from 0.01 hour to 50 hours.

53. The process of claim 42, wherein the activated metalloaluminophosphate molecular sieve is a silicoaluminophosphate molecular sieve.

54. The process of claim 40, further comprising polymerizing olefin in the olefin product, in the presence of a polymerization catalyst system in a polymerization reactor, to produce one or more polymer products.

55. A method of activating metalloaluminophosphate molecular sieve, the method comprising the steps of:

a) providing a metalloaluminophosphate molecular sieve containing template;

b) calcining the metalloaluminophosphate molecular sieve in a calcination unit to remove the template;

c) sweeping gas through the calcination unit to cool the calcined metalloaluminophosphate molecular sieve, while maintaining the calcined metalloaluminophosphate molecular sieve at a catalytic activity index of at least 0.7, wherein the gas has a relative water pressure of at least 0.0001 and contacts the activated molecular sieve at a temperature less than water critical temperature.

56. The method of claim 55, wherein the activated metalloaluminophosphate molecular sieve is maintained at a catalytic activity index of at least 0.8.

57. The method of claim 56, wherein the activated metalloaluminophosphate molecular sieve is maintained at a catalytic activity index of at least 0.9.

58. The method of claim 55, wherein the gas has a relative water pressure of at least 0.001.

59. The method of claim 58, wherein the gas has a relative water pressure of at least 0.01.

60. The method of claim 59, wherein the gas has a relative water pressure of at least 0.1.

61. The method of claim 55, wherein the gas is at a temperature of from 150°C to 300°C.

62. The method of claim 55, wherein the gas is swept through the calcination unit for not greater than 500 hours.

63. The method of claim 62, wherein the gas is swept through the calcination unit from 0.01 hour to 50 hours.

64. The method of claim 55, wherein the activated metalloaluminophosphate molecular sieve is a silicoaluminophosphate molecular sieve.

65. The method of claim 55, further comprising removing the activated metalloaluminophosphate molecular sieve from the calcination unit and storing the removed molecular sieve in an anhydrous environment.

66. The method of claim 55, further comprising removing the activated metalloaluminophosphate molecular sieve from the calcination unit and contacting the removed molecular sieve with an oxygenate to form an olefin product.

67. The method of claim 66, further comprising polymerizing olefin in the olefin product, in the presence of a polymerization catalyst system in a polymerization reactor, to produce one or more polymer products.

68. The method of claim 55, wherein the catalytic activity is catalytic activity in reaction processes selected from the group consisting of catalytic cracking, hydrocracking, dewaxing, olefin forming reactions, aromatics forming reactions, paraffin isomerization, olefin isomerization, paraffin hydroisomerization, olefin hydroisomerization, olefin oligomerization, olefin polymerization, reforming, alkylation, and disproportionation of aromatics.

69. The method of claim 55, wherein the activated molecular sieve is contacted with the gas so as to maintain an ethylene or propylene selectivity of at least 25 wt %.

70. A method of starting-up an olefin forming reaction system, comprising the steps of:

a) sweeping gas through the reaction system to heat up the system, wherein the reaction system contains activated metalloaluminophosphate molecular sieve and the activated metalloaluminophosphate molecular sieve is maintained at a catalytic activity index of at least 0.7 while the system is at a temperature less than water critical temperature; and

b) contacting the activated metalloaluminophosphate molecular sieve in the heated up system with an oxygenate to form an olefin product.

71. The method of claim 70, wherein the activated metalloaluminophosphate molecular sieve is maintained at a catalytic activity index of at least 0.8 while the system is at a temperature less than water critical temperature.

72. The method of claim 71, wherein the activated metalloaluminophosphate molecular sieve is maintained at a catalytic activity index of at least 0.9 while the system is at a temperature less than water critical temperature.

73. The method of claim 70, wherein the gas has a relative water pressure of at least 0.0001.

74. The method of claim 73, wherein the gas has a relative water pressure of at least 0.001.

75. The method of claim 74, wherein the gas has a relative water pressure of at least 0.01.

76. The method of claim 75, wherein the gas has a relative water pressure of at least 0.1.

77. The method of claim 70, wherein the system is at a temperature of from 150°C to 300°C.

78. The method of claim 70, wherein the activated metalloaluminophosphate molecular sieve is contacted with the gas for not greater than 500 hours while the system is at a temperature less than critical water temperature.

79. The method of claim 78, wherein the activated metalloaluminophosphate molecular sieve is contacted with the gas from 0.01 hour to 50 hours while the system is at a temperature less than critical water temperature.

80. The method of claim 70, wherein the activated metalloaluminophosphate molecular sieve is a silicoaluminophosphate molecular sieve.

81. The method of claim 70, further comprising polymerizing olefin in the olefin product, in the presence of a polymerization catalyst system in a polymerization reactor, to produce one or more polymer products.

82. The method of claim 70, wherein the catalytic activity is catalytic activity in reaction processes selected from the group consisting of catalytic cracking, hydrocracking, dewaxing, olefin forming reactions, aromatics forming reactions, paraffin isomerization, olefin isomerization, paraffin hydroisomerization, olefin hydroisomerization, olefin oligomerization, olefin polymerization, reforming, alkylation, and disproportionation of aromatics.

83. The method of claim 70, wherein the activated molecular sieve is maintained at an ethylene or propylene selectivity of at least 25 wt % while the system is at a temperature less than water critical temperature.

84. A method of shutting-down an olefin forming reaction system, comprising the steps of:

a) contacting an activated metalloaluminophosphate molecular sieve in a reaction system with an oxygenate to form an olefin product;

b) stopping contact of the activated metalloaluminophosphate molecular sieve with the oxygenate; and

c) sweeping gas through the reaction system to cool down the system, wherein the activated metalloaluminophosphate molecular sieve is maintained at a catalytic activity index of at least 0.7 while the system is at a temperature less than water critical temperature.

85. The method of claim 84, wherein the activated metalloaluminophosphate molecular sieve is contacted with the gas for a time effective to maintain a catalytic activity index of at least 0.8.

86. The method of claim 85, wherein the activated metalloaluminophosphate molecular sieve is contacted with the gas for a time effective to maintain a catalytic activity index of at least 0.9.

87. The method of claim 84, wherein the gas has a relative water pressure of at least 0.0001.

88. The method of claim 87, wherein the gas has a relative water pressure of at least 0.001.

89. The method of claim 88, wherein the gas has a relative water pressure of at least 0.01.

90. The method of claim 89, wherein the gas has a relative water pressure of at least 0.1.

91. The method of claim 84, wherein the system is at a temperature of from 150°C to 300°C.

92. The method of claim 84, wherein the activated metalloaluminophosphate molecular sieve is contacted with the gas for not greater than 500 hours while the system is at a temperature less than critical water temperature.

93. The method of claim 92, wherein the activated metalloaluminophosphate molecular sieve is contacted with the gas from 0.01 hour to 50 hours while the system is at a temperature less than critical water temperature.

94. The method of claim 84, wherein the activated metalloaluminophosphate molecular sieve is a silicoaluminophosphate molecular sieve.

95. The method of claim 84, wherein the catalytic activity is catalytic activity in reaction processes selected from the group consisting of catalytic cracking, hydrocracking, dewaxing, olefin forming reactions, aromatics forming reactions, paraffin isomerization, olefin isomerization, paraffin hydroisomerization, olefin hydroisomerization, olefin oligomerization, olefin polymerization, reforming, alkylation, and disproportionation of aromatics.

96. The method of claim 84, wherein the activated molecular sieve is further maintained at an ethylene or propylene selectivity of at least 25 wt %.

97. A method of protecting catalytic activity of an activated metalloaluminophosphate molecular sieve in olefin forming reactions due to contact with water vapor, comprising contacting the activated metalloaluminophosphate molecular sieve with a gas containing water to effectively maintain the activated metalloaluminophosphate molecular sieve at a predetermined catalytic activity index, wherein the activated metalloaluminophosphate molecular sieve contains Si and Al at a Si/Al ratio of not greater than 0.5.

98. The method of claim 97, wherein the activated metalloaluminophosphate molecular sieve contains Si and Al at a Si/Al ratio of not greater than 0.3.

99. The method of claim 98, wherein the activated metalloaluminophosphate molecular sieve contains Si and Al at a Si/Al ratio of not greater than 0.2.

100. The method of claim 99, wherein the activated metalloaluminophosphate molecular sieve contains Si and Al at a Si/Al ratio of not greater than 0.15.

101. The method of claim 100, wherein the activated metalloaluminophosphate molecular sieve contains Si and Al at a Si/Al ratio of not greater than 0.1.

102. The method of claim 97, wherein the metalloaluminophosphate molecular sieves contain Si and Al at a ratio of at least 0.005.

103. The method of claim 102, wherein the metalloaluminophosphate molecular sieves contain Si and Al at a ratio of at least 0.01.

104. The method of claim 103, wherein the metalloaluminophosphate molecular sieves contain Si and Al at a ratio of at least 0.02.

105. A method of protecting activated metalloaluminophosphate molecular sieve from loss of catalytic activity, comprising contacting the activated metalloaluminophosphate molecular sieve with a gas containing water at a temperature above water critical temperature.

106. A method of starting-up an olefin forming reaction system, comprising the steps of:

a) sweeping gas through the reaction system to heat up the system, with the reaction system containing activated metalloaluminophosphate molecular sieve, wherein the activated molecular sieve is maintained at a temperature above water critical temperature; and

b) conacting the activated metalloaluminophosphate molecular sieve in the heated up system with an oxygenate to form an olefin product.

107. A method of shutting-down an olefin forming reaction system, comprising the steps of:

(a) contacting an activated metalloaluminophosphate molecular sieve in a reaction system with an oxygenate to form an olefin product;

(b) stopping contact of the activated metalloaluminophosphate molecular sieve with the oxygenate;

(c) sweeping a gas through the reaction system to cool down the system, while the the activated metalloaluminophosphate molecular sieve is maintained at a temperature above water critical temperature.